Research Article

The role of digital mammography in the evaluation of asymmetric breast findings: in correlation with ultrasound

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Abstract
Both breasts are relatively symmetric structures in both size and tissue pattern on mammography. Finding asymmetry is relatively common and can be due to normal physiological and many pathological changes, in most cases of benign nature. However it may indicate underlying malignancy. **Objective:** the aim of this study was to evaluate the role of digital mammography in asymmetric breast findings in correlation with ultrasound. **Patients and methods**: Thirty women underwent breast ultrasonography after finding of asymmetry at mammography. Mammograms and sonograms were evaluated for site and type of asymmetry, associated calcifications, architectural distortion and change from previous examination when available. Biopsy and histopathology was done for cases suspicious for malignancy. **Results:** 66.7% of cases had focal asymmetry and 33.3% had global asymmetry. Asymmetry mostly (76.7% of the cases) represented normal variation of breast tissue distribution, post-operative changes or other benign conditions such as fibrocystic changes, ductectasia, and inflammation. On the other hand, 23.3% of cases are proved to have malignancy. **Conclusion:** Asymmetric breast findings are mostly due to benign etiologies, however, the possibility of underlying malignant cause is also present in lower percentage especially when accompanied by other clinical and radiological suspicious findings.

Keywords: mammography, asymmetric breast, ultrasound

Introduction
Breast cancer is the most frequently diagnosed cancer in women today.[1] Early diagnosis improve the patient outcome and increase the survival rate.[2] Mammography is considered the gold standard tool for screening for the early detection of breast cancer with a sensitivity of 70-90%.[3] Digital mammography can reveal pronounced evidence of abnormality, such as masses and calcifications, as well as subtle signs such as bilateral asymmetry and architectural distortion.[4]

Finding asymmetry is relatively frequent on examination. Bilateral asymmetry is one of the abnormalities that may indicate breast cancer in its early stage. Asymmetry in mammography is defined as an area of fibroglandular density that is more prominent and extensive in one breast relative to the corresponding region in the other breast.[5,6] There are 4 types of asymmetry according to the American college of radiology; asymmetry, focal asymmetry, global asymmetry and developing asymmetry. Mammographic asymmetry is usually of benign nature due to normal physiological and many benign pathological changes. However it can be concerning if changing or enlarging in size, if palpable mass is present and if associated with other findings, such as microcalcifications or architectural distortion.[7] Management of mammographic asymmetry may need other imaging modalities to help for better characterization of the findings detected at mammography such as ultrasonography, contrast enhanced digital mammography (CEDM) or MRI which should be applied appropriately in a logical work flow.[8]

Aim of the work

Evaluation of mammographic breast asymmetry using digital mammography in correlation to ultrasonography and histo-pathology in suspicious cases.

Patients and Methods

This study included 30 female patients referred to Radiology department of Minia University Hospital from July 2018 to April 2019 for mammographic examination. They underwent clinical examination, mammo-graphy and ultrasonography. Suspicious lesions underwent biopsy and histopathology.

Study equipments and techniques

- Digital mammographic examinations were performed using "Fuji Amulet Innovality" digital mammography device.
- The ultrasound examinations were performed using "Toshiba Aplio 500 device" with the 10 MHz small parts linear transducer**.**
- True cut biopsy using 16/14 g needle under US guidance.
- US guided fine needle aspiration biopsy (FNAB).

Results

The current study revealed that 56.6% of the cases had benign breast lesions, 23.3% of cases had malignant pathology while 20% of cases were normal. Table (1)

Regarding clinical examination, (57.1%) of the cases with malignant lesion had palpable mass in contrast to only 13% at cases with benign and normal diagnosis, the difference was significant (P value 0.03). Table (2)

We also found that 71.4% of cases with malignant diagnosis had asymmetry in addition to other suspicious features (architectural distortion and/or suspicious micro-calcifications) while only 4.3% of cases with benign pathology had such features (architectural distortion), the difference was significant (P value 0.001), this is illustrated at Table (3).

In the current study mammography had a sensitivity of 71.4%, a specificity of 95.7%, a positive predictive value of 83.3%, a negative predictive value of 91.7% and diagnostic accuracy of 90% Table (4). Ultrasound had a sensitivity of 85.7%, a specificity of 87%, a positive predictive value of 66.7%, a negative predictive value of 95.5% and diagnostic accuracy of 86.7% Table (4). Diagnostic accuracy of combined sonomammography was superior to the accuracy of each of them separately (93.3%). Table (4).

Table (1) show final case diagnosis (pathology proven).

Type	Number	Frequency
Normal	6	20%
Benign/probably benign	17	56.6%
Malignant	7	23.3%
Total	**30**	**100%**

Table (2): Relation between presence of palpable mass clinically and case diagnosis.

Palpable mass clinically	Malignant (biopsy proven) Total = 7 (100%)	Benign/Normal Total = 23 (100%)	P value
Positive	4 (57.1%)	3 (13.0%)	0.03*
Negative	3 (42.9%)	20(86.9%)	

Table (3): Relation between associated mammographic features suggesting malignancy and case diagnosis.

Calcification/ architecture distortion	Malignant (biopsy proven) Total =7(100%)	Benign/Normal Total =23(100%)	P value
Positive	5 (71.4%)	1(4.3%)	0.001*
Negative	2 (28.6%)	22 (95.7 %)	

Table (4): Sensitivity, Specificity, positive & Negative predictive value and diagnostic accuracy of mammography, Ultrasound and both.

Parameter	Mammography (Asymmetry associated with suspicious features)	Ultrasound	Mammography+ Ultrasound
Sensitivity	71.4%	85.7%	100%
Specificity	95.7%	87%	91.3%
Positive predictive value	83.3%	66.7%	77.8%
Negative predictive value	91.7%	95.5 %	100%
Diagnostic accuracy	90%	86.7%	93.3%

Cases presentation

Case 1

Female patient 46 years old, with positive family history, presented by right breast and axillary lumps. Mammography shows Rt. Sided global asymmetry and skin thickening at retroareolar region, mass lesion at LIQ Rt. breast, bulky Rt. axillary lymph nodes. US shows irregular hypoechoic mass with spiculated margins, retroareolar edema as well as suspicious looking axillary lymph nodes. (Figure 1). Histopathologically proven Invasive duct carcinoma grade II.

Case 2

Female patient 47 years old with positive family history, presented by bloody nipple discharge from the right breast. Mammography shows focal asymmetry at the retroareolar region Rt. breast. Benign looking lesion with popcorn calcification at the UOQ of Rt. Breast. Benign looking lymph nodes are seen at both axillae. US shows hypoechoic mass of irregular shape, spiculated margins at the retroareolar region. A well circumscribed round hypo echoic lesion with posterior acoustic shadowing correlating to calcified mass at mammography. (Figure 2) The retroareolar lesion proved to be duct carcinoma in situ.

Case 3

Female patient 54 years old with positive family history, coming for screening. Mammography shows central focal asymmetry at the right breast with suspicious looking micro calcifications. US shows hypoechoic solid mass with irregular spiculated margins at the Rt. Breast, Rt. sided axillary lymph nodes with thick cortex and lost hilum. (Figure 3) Histopathologically proven Invasive duct carcinoma.

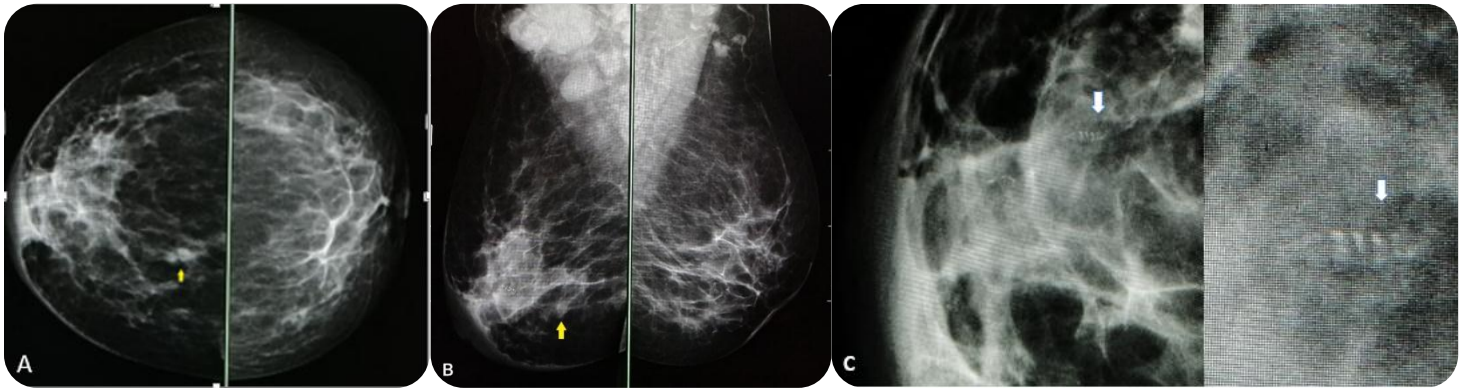

Fig. 1-1: A) CC & **B**) MLO views showing central global asymmetry at the retroareolar and UOQ of the right breast with clustered microcalcifications and skin thickening. An irregular small mass is noted at the LIQ (yellow arrow). Bulky lymph nodes at the right axilla are seen. c) Magnification of the CC view shows fine linear microcalcifications (white arrows).

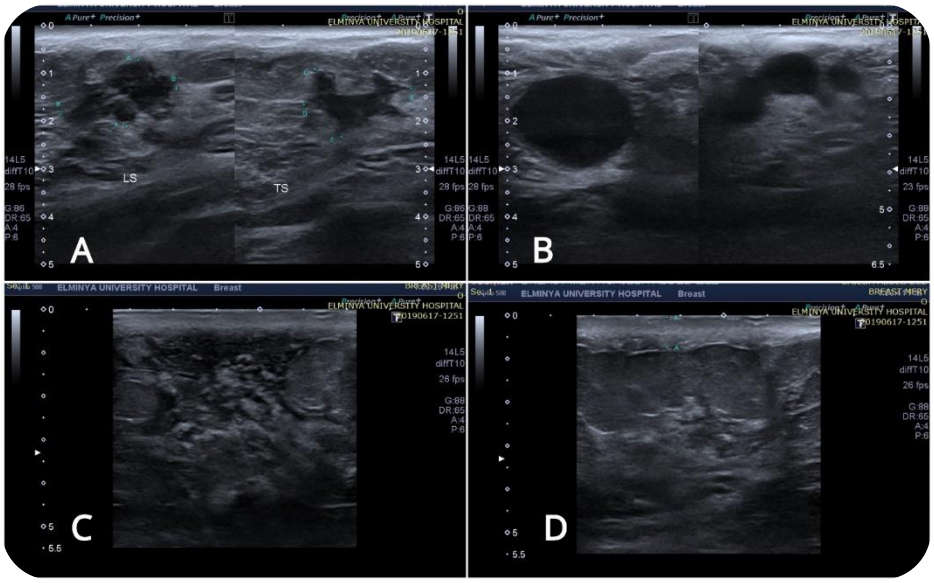

Fig. 1-2: (A) Rt. Breast US shows irregular mass with speculated margins at LIQ. (**B)** US of Rt. Axilla shows suspicious lymph nodes with globular shape, thick cortex and lost fatty hilum. **(C) & (D)** US of the retroareolar region showing edema and thickening of the skin.

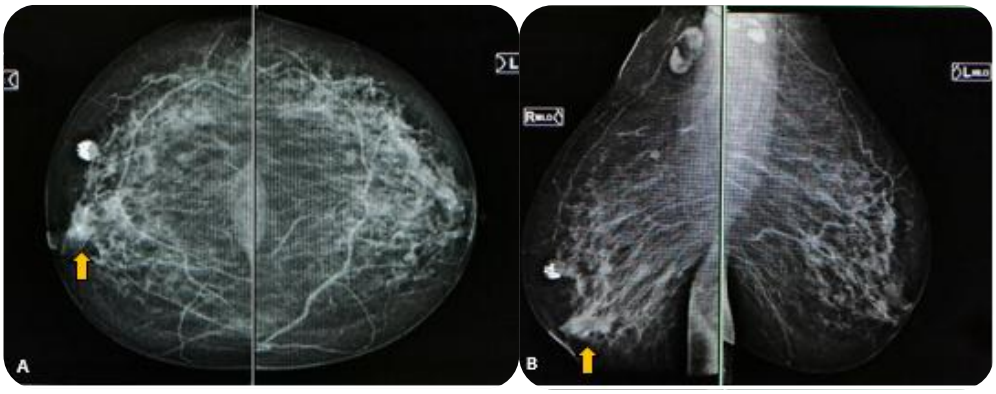

Fig.2 -1: A) CC & **B**) MLO views. There is a central focal asymmetry at the retroareolar region of the right breast (yellow arrows). Benign looking calcified lesion with popcorn calcification is seen at the UOQ of Rt. Breast. Benign looking lymph node is seen at both axillae.

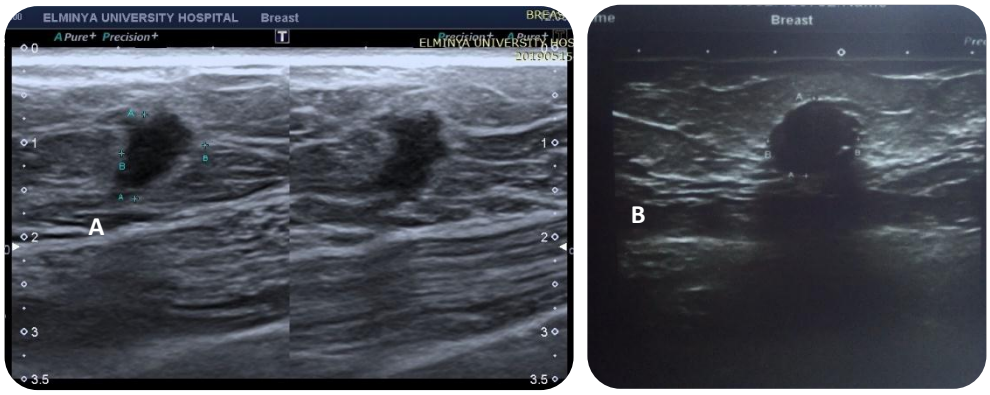

Fig.2 -2: US shows **(A)** hypoechoic solid mass with irregular shape, spiculated margins at the retroareolar region. (**B)** Well circumscribed round hypo echoic mass with posterior acoustic shadowing correlating to calcified mass at mammography.

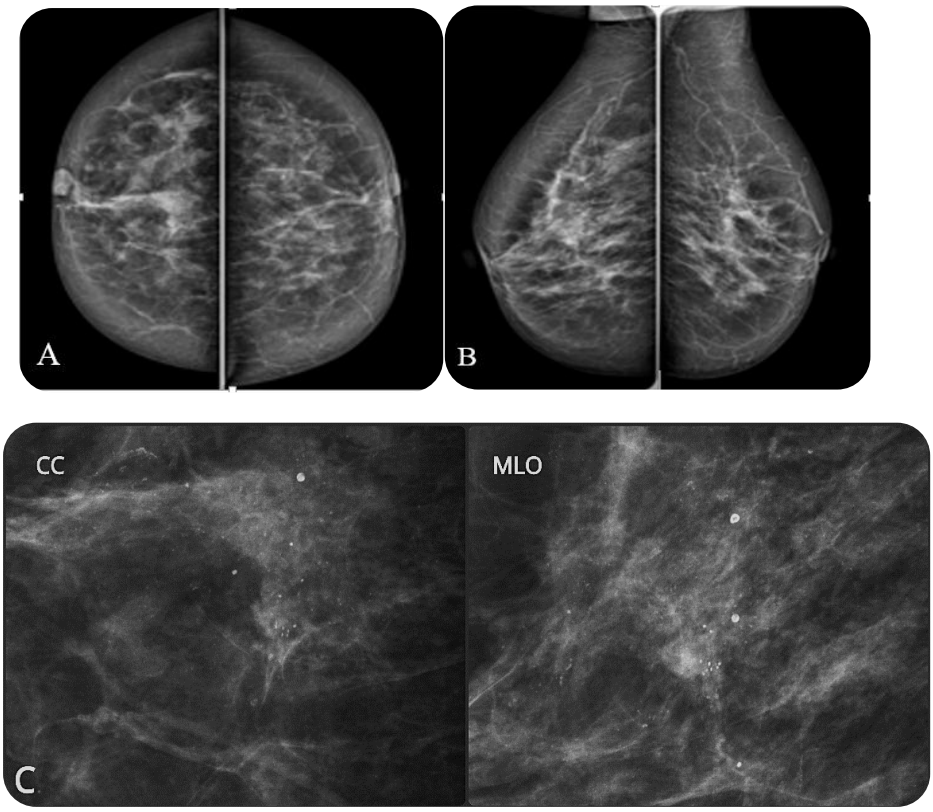

Fig. 3-1: A) CC & **B**) MLO views. There is a central focal asymmetry at the right breast with suspicious looking micro calcifications. (C) Magnification of the CC & MLO views showing suspicious micro calcifications.

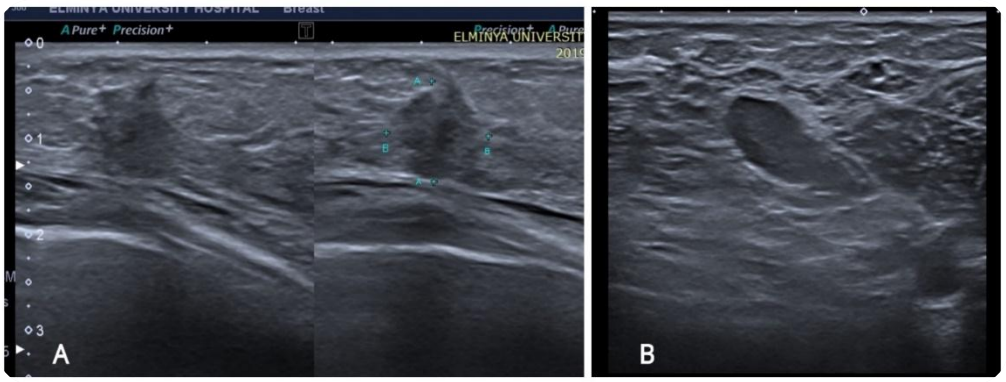

Fig. 3-2: US shows **(A)** hypoechoic solid mass with irregular spiculated margins at the Rt. Breast **(B)** shows enlarged lymph node with thickened cortex and thinned out eccentric hilum.

Discussion

In this study, the majority of cases of mammographic asymmetry had benign breast findings (56.66%) while 20% of the cases were normal. On the other hand, 23.3% of the cases had underlying malignancy (confirmed histo-pathologically). These results are in agreement with Badawi HA. et al., 2010[9] study who stated that 53.4% of the cases were due to benign mammary changes, 18.6% of cases were normal with no underlying mass or cystic changes and 27.9% of cases were found to have malignancy confirmed pathologically. These results are highly comparable to the results of the current study. This is in less agreement with the study done by Zare Z. et al., 2011 [10], reporting that the vast majority of the studied cases (77%) were completely normal glandular breast tissue, 22% of the cases had benign pathological findings and only one case (1%) was malignant (confirmed pathologically).

In the current study, palpable mass was detected in 57.1% of the malignant cases, while it was found only in 13% of the benign cases, the difference is significant (P value= 0.03). This is concurrent with Youk JH. et al., 2009 [11] stating that finding a clinically palpable correlating to asymmetry should raise the concern for underlying breast cancer.

In the current study, mammographic asymmetry was associated with other concerning features such as suspicious-looking micro-calcification and/or architectural distortion more notably among the cases with malignancy than those with benign findings (71.4% Vs. 4.3% respectively) and the difference was significant (P value 0.001). This finding is in agreement with Youk JH. et al., 2009[11] and Bandyopadhyay SK et al., 2011[2] who reported that the presence of clustered micro-calcifications or architectural distortion increase the likelihood of malignancy in cases with breast asymmetry.

In the current study, comparing sensitivity, specificity, positive and negative predictive values as well as diagnostic accuracy of mammography, sonography and their combination, we found that the sensitivity and specificity of combined sono-mammography were 100% and 91.3% respectively which is congruent to the study done by Masroor I. et al., 2009 [12] demonstrating that the sensitivity and specificity of sono-mammography in detecting breast cancer were 100% and 85% respectively. The diagnostic accuracy of mammography, sonography and combined sonomammography in this study were 90%, 86.6% and 93.3% respectively. This is in agreement with the results of Khan TS. et al., 2016 [13] showing diagnostic accuracy of 81.4%, 71% and 85.5% respectively, however our results are slightly higher also, this may be due to the little number of cases.

Conclusion

In conclusion, mammographic breast asymmetry is considered a frequent and finding. It includes wide range of underlying causes, ranging from normal different tissue compo-sitions till malignant breast lesions. The majority of cases are due to variation of the normal fibro-glandular breast tissue or due to different benign etiologies. However, underlying malignancy should be suspected if there are some concerning mammographic signs of malignancy or clinically palpable mass. In absence of such associated findings, cases with asymmetry can be managed safely by follow up while presence of any of these findings mandates further work to exclude malignancy. Addition of ultrasound examination to the mammography is found to improve the diagnostic accuracy in comparison to each examination separately.

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